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MICHIGAN'S PA295 ENERGY OPTIMIZATION PROGRAMS: RATIONALE AND RESULTS

Presentation to the Michigan House Energy and Technology Committee
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by
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The American Council for an Energy-Efficient Economy (ACEEE)

- Nonprofit 501(c)(3) focused on energy efficiency and the economy, conducting research, communications, and conferences.
- ~40 staff in Washington DC, + field offices in DE, MI, and WI.
- Focus on End-Use Efficiency in Industry, Buildings, Utilities, and Transportation; and State & National Policy
- Funding:
  - Foundations (34%)
  - Federal & State Grants (7%)
  - Specific Contract work (21%)
  - Conferences and Publications (34%)
  - Contributions and Other (4%)

Martin Kushler, Ph.D. (Senior Fellow, ACEEE)

- 30 years conducting research in the utility industry, including:
- 6 years as President of the International Energy Program Evaluation Conference
- 10 years as Director of the ACEEE Utilities Program
- **10 years as the Supervisor of the Evaluation section at the Michigan PSC**
- Have assisted over a dozen states with utility EE policies

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2013 ACEEE National Conference on Energy Efficiency as a Resource [Sept.22-24, 2013, Nashville, TN]

Keynote speakers:

>Bill Johnson, President and CEO of the Tennessee Valley Authority (TVA)

>Colette Honorable, Chair, Arkansas Public Service Commission, next President of NARUC

Michigan well represented

- DTE Energy one of 3 major utilities presenting on 'rapid ramp-up' of energy efficiency programs
- Consumers Energy presented on their low-income EO programs

All presentations will be posted by October 4th

http://www.aceee.org/conferences/2013/eer

TOPICS

I. Background: how Michigan ended up with Energy Optimization

- The economics
  - Michigan's huge energy cost problem
  - Michigan's energy resource deficit
  - Energy efficiency is the cheapest resource
- Michigan's energy policy history
  - Why public policy requirements are necessary

II. How has Energy Optimization performed?

- Program cost-effectiveness
- Overall resource impacts

III. What is the remaining potential?

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I. BACKGROUND LEADING TO PA 295

Three key points underscored the rationale for Energy Optimization in Michigan

1. Michigan has a serious energy dollar drain
2. Energy efficiency is by far the cheapest energy resource
3. Michigan utilities were not providing energy efficiency programs for customers

KEY POINT #1:
MICHIGAN HAS A HUGE ENERGY PROBLEM

- Michigan uses a lot of energy
  - Total cost $22 billion per year in 2000
    By2010, had increased to over $31 billion!!!
  - 9th highest cost burden in the nation

- **Michigan is almost totally dependent on fuels imported from other states and countries**

  We import:
  - 100% of the coal and uranium we use
  - 96% of oil & petroleum products
  - 80% of the natural gas

Source: U.S. Energy Information Administration

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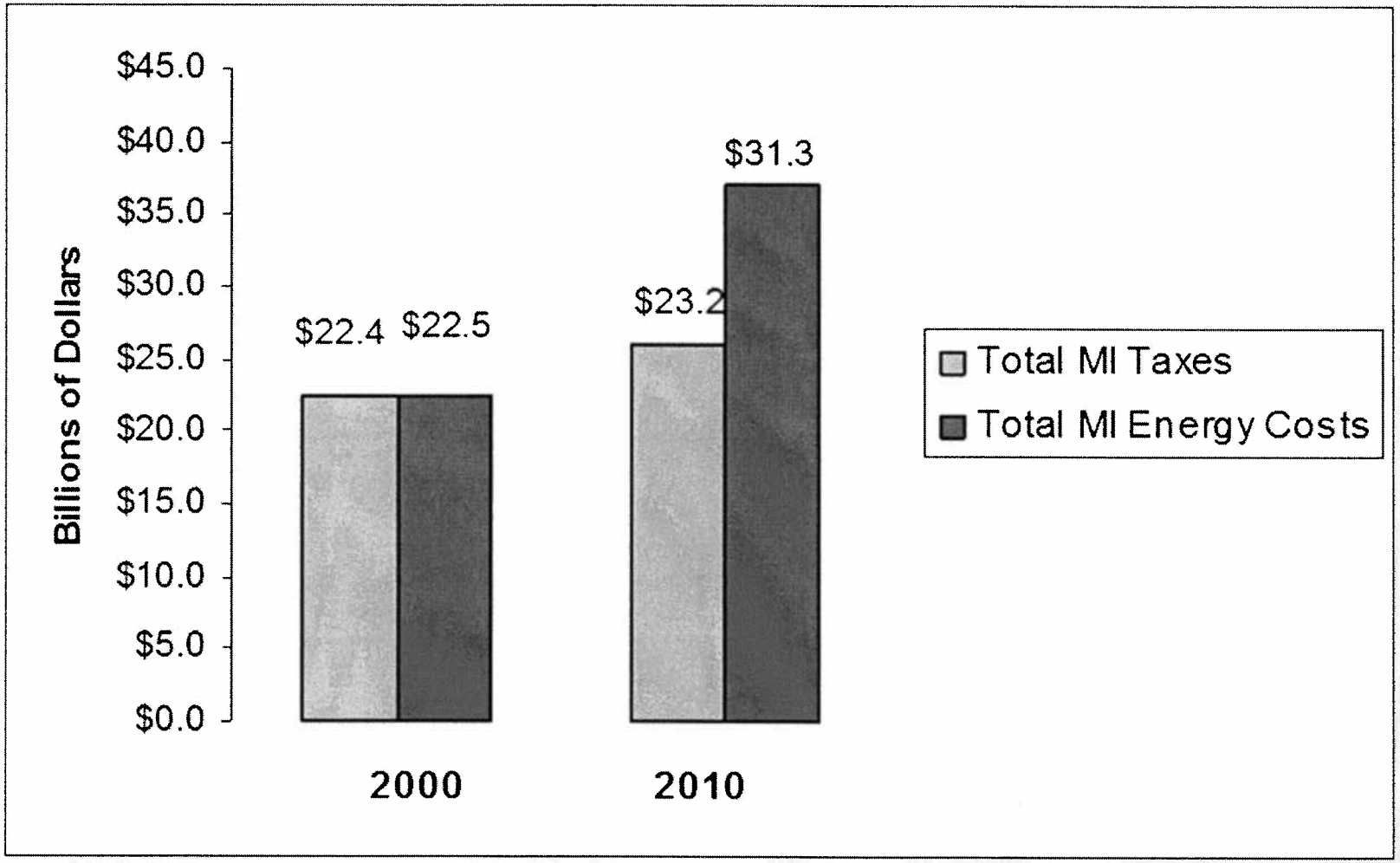
Total Michigan Taxes vs. Michigan Energy Costs 2000 vs. 2010



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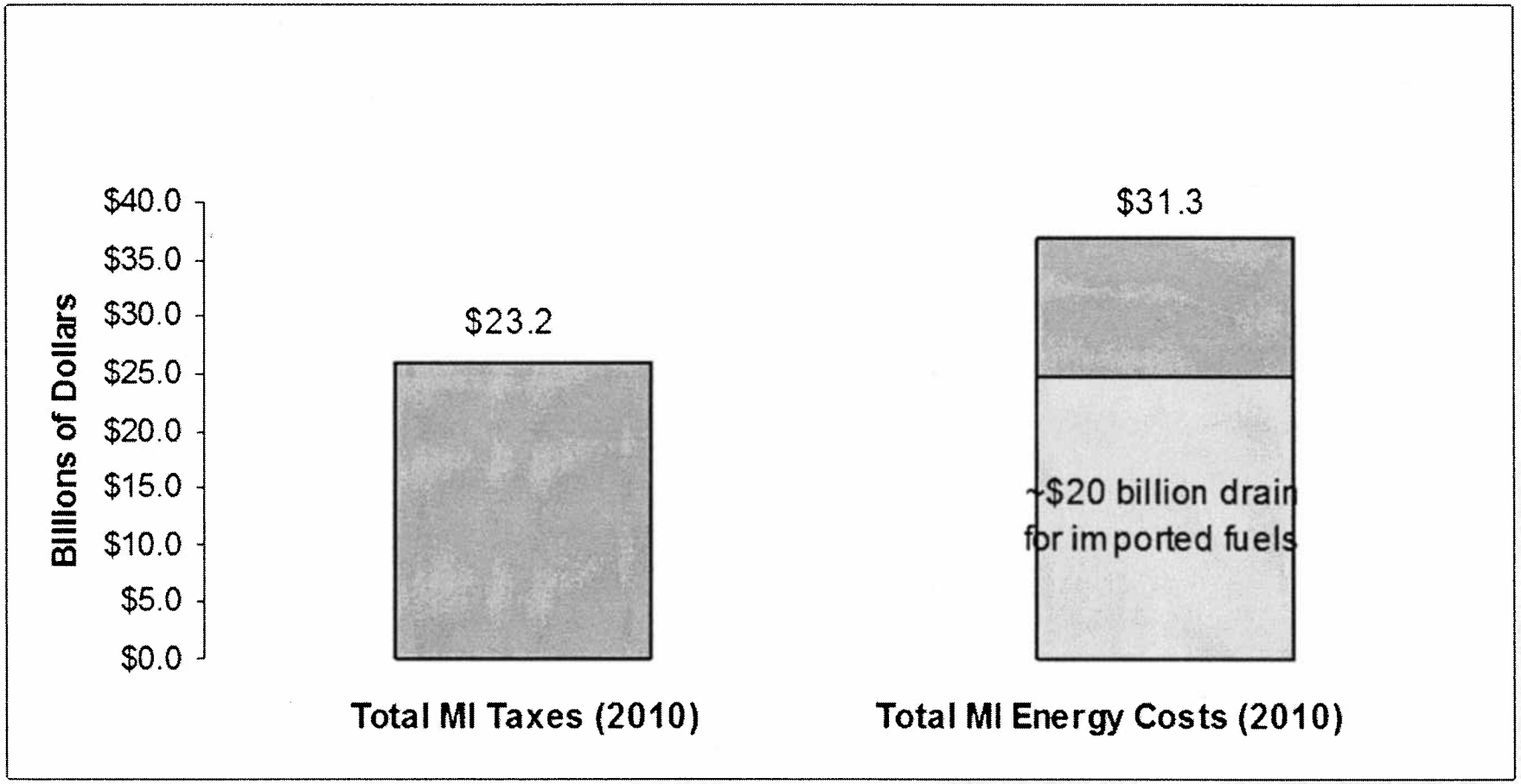
COST OF MICHIGAN'S ENERGY IMPORTS

- Before the new 'high energy cost' era (circa 2000), roughly $12 billion per year was leaving Michigan to pay for fuel imports
- **At 2010 market prices, this dollar outflow was over $20 billion per year**

THIS IS A HUGE ECONOMIC DRAIN ON OUR STATE ECONOMY!

Economic Burden on Michigan Homes and Businesses: Taxes vs. Energy Costs (2010)



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EFFECTS ON THE STATE ECONOMY

This **additional $8 billion** annual drain on Michigan's economy is roughly equivalent to the lost payroll from **closing 160 major manufacturing plants**.

(assumes 1000 jobs @ $50,000 each, per plant)

Even the Wall Street Journal has written about the unprecedented transfer of wealth, calling it a "bonanza" and "windfall" for the handful of big energy producing states (i.e., AK, NM, ND, WY and TX) and countries (e.g., OPEC).

HOW IMPORTANT IS THIS?

It is arguably the case that high energy costs, and Michigan's huge energy import dependence,

….are the single biggest factors explaining Michigan's tough economic times since 2000.

>>>Michigan needed to develop strategies to reduce that energy dollar drain

MICHIGAN IS VERY LIMITED IN "TRADITIONAL" FUELS

MICHIGAN'S RECOVERABLE RESERVES AS A SHARE OF U.S. RECOVERABLE RESERVES (Source: U.S. EIA)

- Coal: 0%
- Uranium: 0%
- Oil: 0.2%
- Natural Gas: 1.0%

Michigan needed to develop strategies that reduce our dependence on these imported resources

FOR OUR OWN ECONOMIC WELL-BEING MICHIGAN NEEDED TO DEVELOP:

- Energy Efficiency (which is 100% "local")
- Cost-effective Michigan-based Renewable Energy

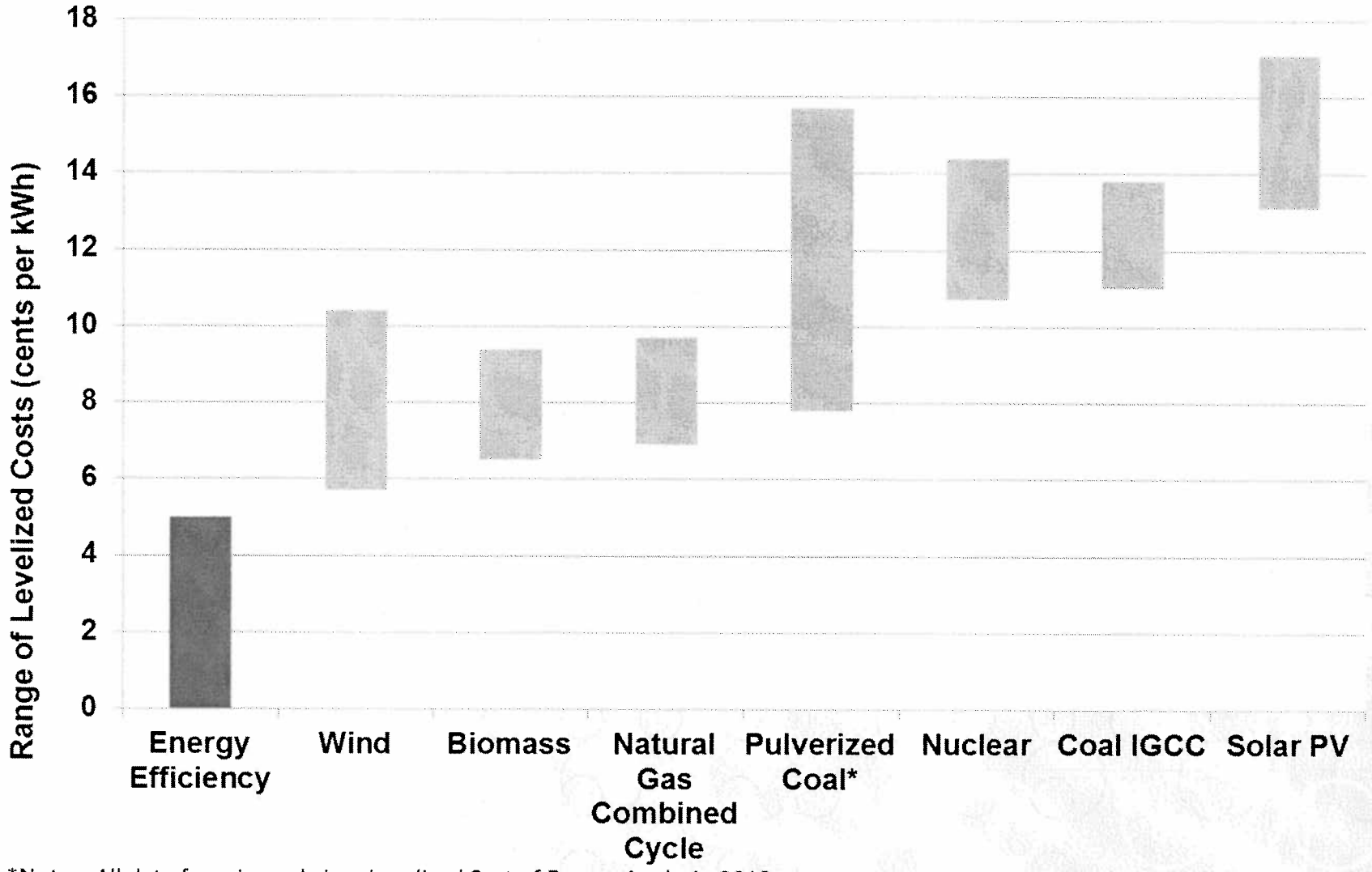
KEY POINT #2

It is much cheaper to save energy than it is to produce it.

[We can save electricity for about one-third the cost of producing it through a new power plant]

>>> Energy efficiency is by far the cheapest energy resource available to Michigan

COST COMPARISON OF ELECTRICITY RESOURCE OPTIONS



*Notes: All data from Lazard , Inc. *Levelized Cost of Energy Analysis,* 2012.

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WHAT IS AN "ENERGY EFFICIENCY PROGRAM" ?

*An **organized and comprehensive** effort to assist customers (residential and business) to implement energy efficiency improvements to their buildings and equipment (e.g., more efficient lights, heating and cooling systems, appliances, pumps, motors, insulation, etc.)*

Key elements

- Public information, education and persuasion
- Information, training, and incentives to "trade allies" (retailers, contractors, etc.)
- Economic incentives for customers (e.g., rebates)
- Quality control, monitoring, and evaluation

[Customers can often save 10-30% on utility bills]

RATIONALE FOR ENERGY EFFICIENCY AS A *UTILITY SYSTEM RESOURCE*

SIMPLY STATED:

- Utility systems need to have adequate supply resources to meet customer demand
- To keep the system in balance, you can add supply resources, reduce customer demand, or a combination of the two
- In virtually all cases today, it is much cheaper to reduce customer demand than to acquire new supply resources

  [True for electricity and natural gas]

>>> In a number of states today, energy efficiency is officially the "first priority" resource that utilities must add to their system… and in many cases, is meeting 50-100% of projected load growth.

The New England ISO and the PJM ISO officially quantify and include energy efficiency as a key part of their system capacity plans

IN PA 295, ENERGY OPTIMIZATION IS BASED ON THIS CONCEPT OF ENERGY EFFICIENCY AS A 'RESOURCE'

From PA 295, Sec. 13 (d):

"Utility system resource cost test" means a standard that is met for an investment in energy optimization **if, on a life cycle basis, the total avoided supply-side costs to the provider, including representative values for electricity or natural gas supply, transmission, distribution, and other associated costs, are greater than the total costs to the provider of administering and delivering the energy optimization program**, including net costs for any provider incentives paid by customers and capitalized costs recovered under section 89."

KEY POINT #3:
MICHIGAN UTILITIES WERE COMPLETELY FAILING TO PROVIDE ENERGY EFFICIENCY

While dozens of states had major utility energy efficiency programs….saving their customers hundreds of millions of dollars….

Michigan utilities had **no** customer energy efficiency programs from 1996 to 2008

MICHIGAN ENERGY POLICY HISTORY

2007/2008 was really the first time Michigan took a comprehensive look at its state energy policy

- The Michigan Public Service Commission (MPSC) conducted an extensive public process and analysis, and produced the Michigan *21st Century Electric Energy Plan in 2007*

  http://www.dleg.state.mi.us/mpsc/electric/capacity/energyplan/index.htm

- The legislature held extensive hearings and passed PA 295 in 2008

WHY IS PUBLIC POLICY (LIKE PA 295) NEEDED?

Under traditional regulation, utilities are not motivated to help customers use less energy. Rather, they are motivated to build more generating plants, earn a rate of return on supply investments, and sell more kWh to customers to increase revenue and profits

In my 30 years of experience in this field, I have not seen a single investor-owned utility implement serious energy efficiency programs for their customers in the absence of a legislative or regulatory requirement to do so.

Without a public policy requirement, utilities will fail to pursue what is clearly the lowest-cost resource for the utility system: customer energy efficiency improvements

MICHIGAN IS A PERFECT CASE IN POINT

- In the early 1990's, under a strong MPSC requirement and incentive, Michigan was among the national leaders in utility efficiency programs
- Our top utilities were spending 1 to 2% of revenues on energy efficiency
- Independent evaluations documented that the energy efficiency programs were very cost-effective (1.5 to 2.6 cents per kWh saved)…less than half the cost of new electric supply
- The programs were very popular with the public

<u>Policy change</u>

- Michigan's requirement for utility energy efficiency programs was ended by the MPSC in 1996, in the rush to utility deregulation
- The MPSC instead encouraged the utilities to develop their own proposals for continuing energy efficiency programs for customers.

A 'VOLUNTARY' SCENARIO RESULTED IN NO UTILITY ENERGY EFFICIENCY PROGRAMS

In response to the "voluntary" approach, no utility in Michigan proposed or implemented energy efficiency programs for customers from 1996-2008

That situation only changed when PA 295 was passed in 2008. PA 295 created an energy efficiency resource standard* requirement for utility "energy optimization" programs, and made other regulatory adjustments to reduce the economic disincentive for utilities to help their customers be more energy efficient.

The Michigan policy for Energy Optimization has been extremely successful….as the annual reports from the MPSC clearly document

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* Over 25 states now have similar standards

II. HOW HAS ENERGY OPTIMIZATION PERFORMED?

COMPARISON OF PREDICTIONS TO ACTUAL RESULTS

In 2005, MPSC Staff conducted a Capacity Needs Forum (CNF) and concluded Michigan was alarmingly short of generating capacity, and needed to proceed aggressively to add capacity

In Feb. 2006 I testified before the Senate Energy and Tech. Committee and said:

"The CNF forecast of future demand growth is just one possible 'business as usual' scenario…. Through policies and programs, Michigan can cost-effectively reduce demand growth and the amount of generating capacity needed"

I added: *If Michigan utilities spent $100 million/yr. on energy efficiency programs, they could save $2 to $3 for every dollar*

Actual Results: Demand growth in Michigan has been significantly reduced, and Energy Optimization has averaged ~ $106 million per year in spending and saved $3.55 per dollar spent

COMPARISON OF PREDICTIONS TO ACTUAL RESULTS

In 2007, I testified before this committee and stated the following:

"We have over two decades of experience showing energy efficiency programs can:

- Save natural gas at $2.50/Mcf or less
- Save electricity at 3 cents/kWh or less"

I also noted that comparable costs for electricity supply resources were in the range of 6 cents to 10 cents/kWh

I added that ACEEE's own studies had shown that energy efficiency programs produced utility system costs savings that exceeded the program costs by over 2 to 1

ACTUAL RESULTS

We now know that Michigan's Energy Optimization performance has been even better than those national averages. In their most recent annual reports* the MPSC reported:

- Energy Efficiency: **2.0** cents/kWh ($1.85/Mcf for gas EE)
- New gas combined cycle plant: **6.6** cents/kWh
- New coal-fired power plant: **11.1** Cents/kWh
- Current weighted average of power supply costs in Michigan, including purchased power: **6.4** Cents/kWh (excluding transmission costs)
- Energy Optimization programs produce **$3.55** in utility system cost savings for every $1 in program costs

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* *2012 Report on the implementation of P.A. 295 Utility Energy Optimization Programs*, November 30, 2012. *Report on the implementation of the PA 295 Renewable Energy Standard and the Cost-Effectiveness of the Energy Standards*, MPSC 2013

CONGRATULATIONS TO MICHIGAN!

In ACEEE's ***2011 State Energy Efficiency Scorecard***, Michigan was recognized as the "most improved state" in the nation….rising from 27th to 17th.* The report cites the importance of Michigan's 2008 legislation [PA 295]:

Michigan is "***reaping the rewards from Energy Efficiency Resource Standards (EERS) passed in 2008, which requires the state's utilities to provide portfolios of energy efficiency programs sufficient to meet a specific energy savings target that ramps up over time."*** (p. viii)

[Congratulations to the Michigan legislature, which passed PA295 in 2008 with strong bi-partisan majorities in the Senate (26-10) and House (83-24)]

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* Michigan was again among the most improved in the 2012 Scorecard….rising to 12th in the nation. (Was 33rd in 2006)

Experience since 2008 shows that energy efficiency is already working as a ***Resource***

From PA295, Section 71:

"*The overall goal of an energy optimization plan shall be to* ***reduce the future costs of provider service to customers****. In particular, an EO plan shall be* ***designed to delay the need for constructing new electric generating facilities and thereby protect consumers from incurring the costs of such construction****.*"

PA 295 HAS ALREADY SAVED MICHIGAN RATEPAYERS BILLIONS OF DOLLARS

In 2006, conventional wisdom was that Michigan needed as many as 4 new large coal-fired generating plants. At least that many plants were on the drawing board and being actively considered.

In 2007, the MPSC called "time out", and conducted an extensive public process and data analysis, leading to the *Michigan 21st Century Electric Energy Plan*

One key objective of the analysis was to examine the potential for other types of resources….including energy efficiency and renewable energy….to reduce ratepayer costs compared to an 'all central generating station' supply plan

The results of that analysis, and the subsequent policies implemented in PA 295, have already saved Michigan ratepayers billions of dollars.

MPSC 21st CENTURY ENERGY PLAN

"...modeling for the Plan showed that, in the absence of any energy efficiency programming, Michigan would need no fewer than four new 500 MW baseload units by 2015 to meet forecasted demand. ***With energy efficiency programming, the model decreased the forecasted need to two new baseload units*** *on a staggered basis, and with the addition of RPS, this projection has been decreased further to one new unit by 2015." (p.32)*

"By displacing traditional fossil fuel energy, ***the energy efficiency program alone could save Michigan $3 billion in electricity costs over the next 20 years****." (p.33)*

21st CENTURY PLAN PREFERRED POLICY SCENARIO

Energy efficiency program funding:

- Average of $114 million/yr. for first five years
  [annual savings ~ 0.6% of total annual sales]
- Average of $146 million/yr. over first ten years
  [savings ~ 0.9% of total annual sales yrs 6-10]

- Reduces total net utility system costs by over $3 billion over 20 years.

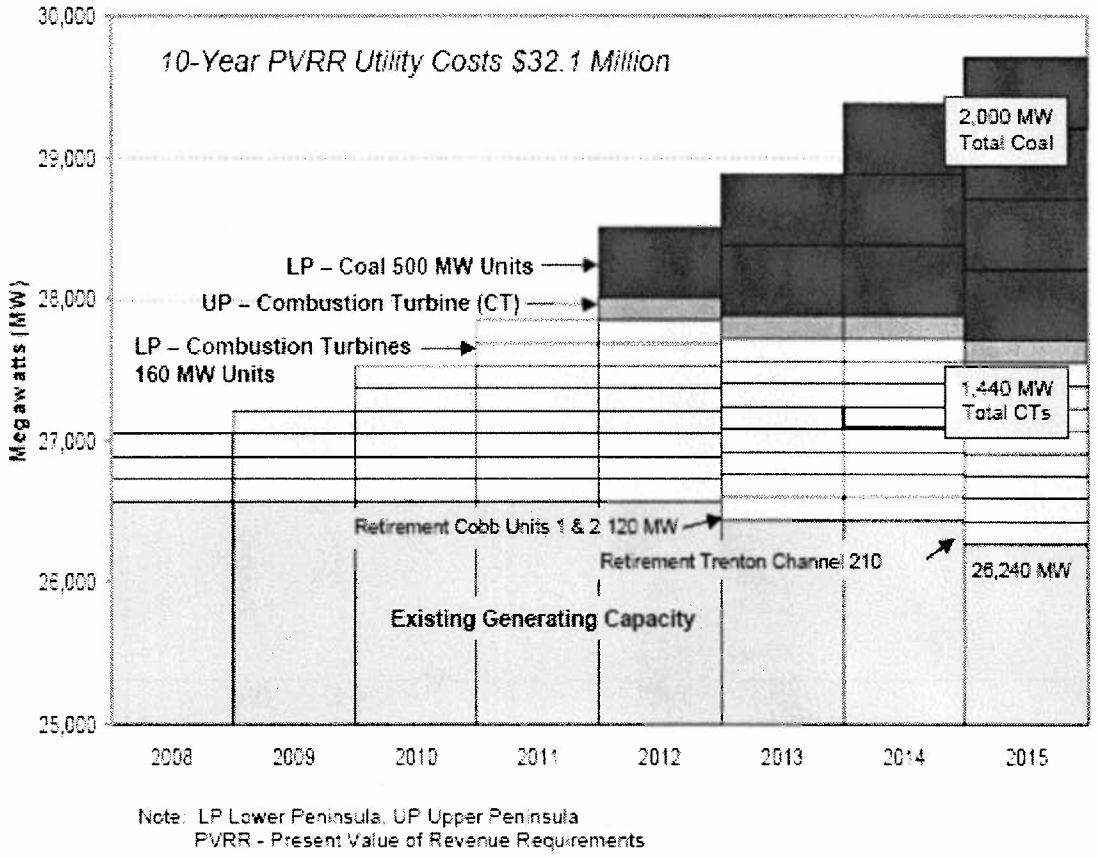
From Michigan 21st Century Plan

(http://www.dleg.state.mi.us/mpsc/electric/capacity/energyplan/index.htm)

Central Station Generation Scenario (Appendix I, p.6)

(represented "business as usual" in 2007)

Figure 4: Schedule of Cumulative Generation Additions for the Central Station Scenario



Note: LP Lower Peninsula, UP Upper Peninsula
PVRR - Present Value of Revenue Requirements

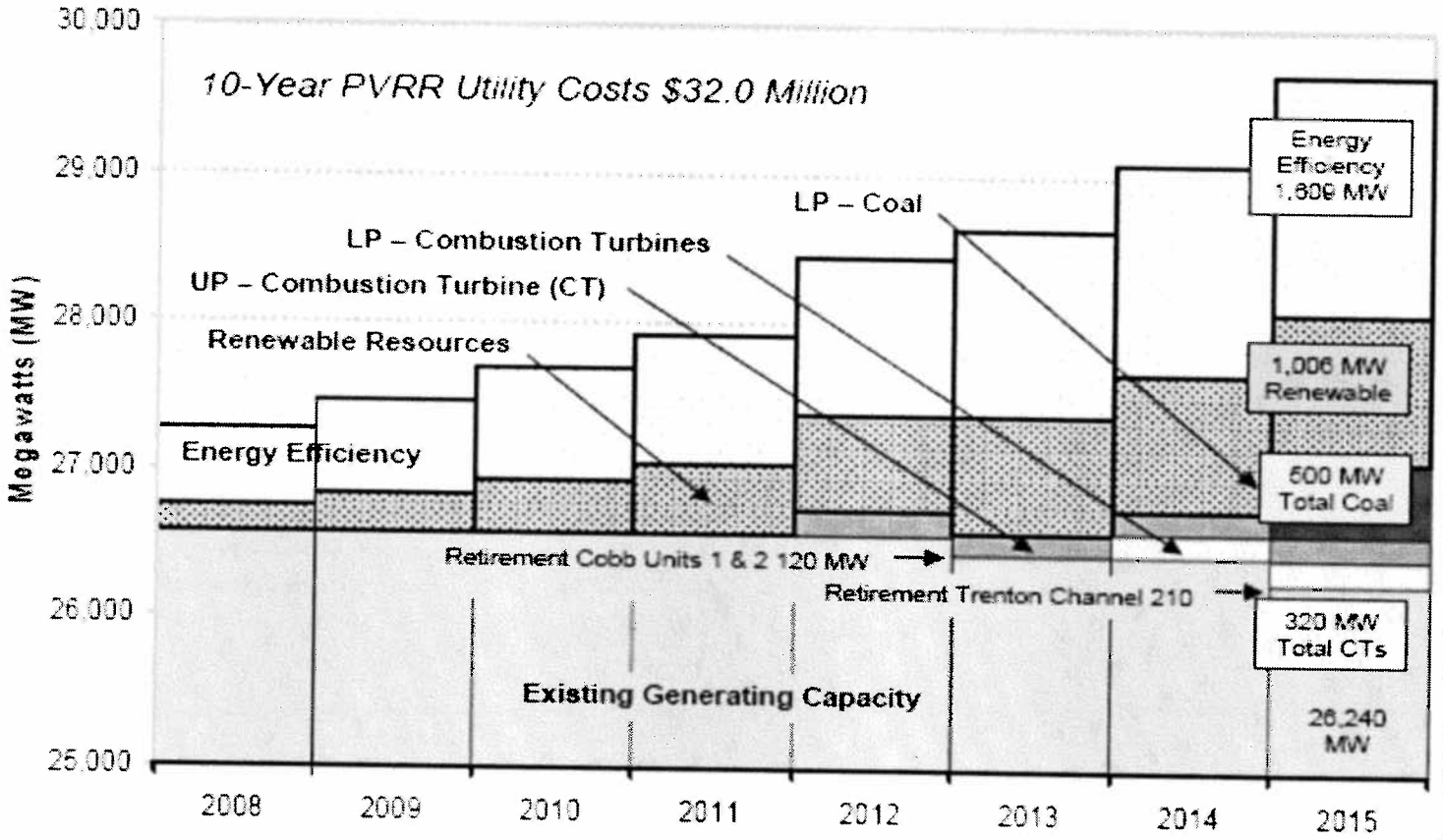
Coal: 10 cents/ kWh + carbon

nat gas 8-9 cents/ kWh or 8-9 cents/ for purch. power

From Michigan 21st Century Plan: Energy Efficiency & Renewable Energy Scenario

(Appendix I, p.7)

Figure 5: Schedule of Cumulative Generation Additions for the Energy Efficiency with Renewable Energy Scenario



Note: LP Lower Peninsula, UP Upper Peninsula
PVRR - Present Value of Revenue Requirements

Energy Efficiency 3 cents/ kWh (no carbon)

Wind 7-8 cents/ kWh (no carbon)

A little gas or purch. power

THE 21ST CENTURY PLAN LED TO PA 295

The Michigan 21st Century Electric Energy Plan of 2007 helped lead directly to the passage of PA 295 in 2008….
…..which created for the ***first time*** in Michigan:

1. A requirement for utility energy efficiency programs, including annual energy savings requirements; and
2. A renewable energy portfolio standard, requiring 10% renewable electricity by 2015

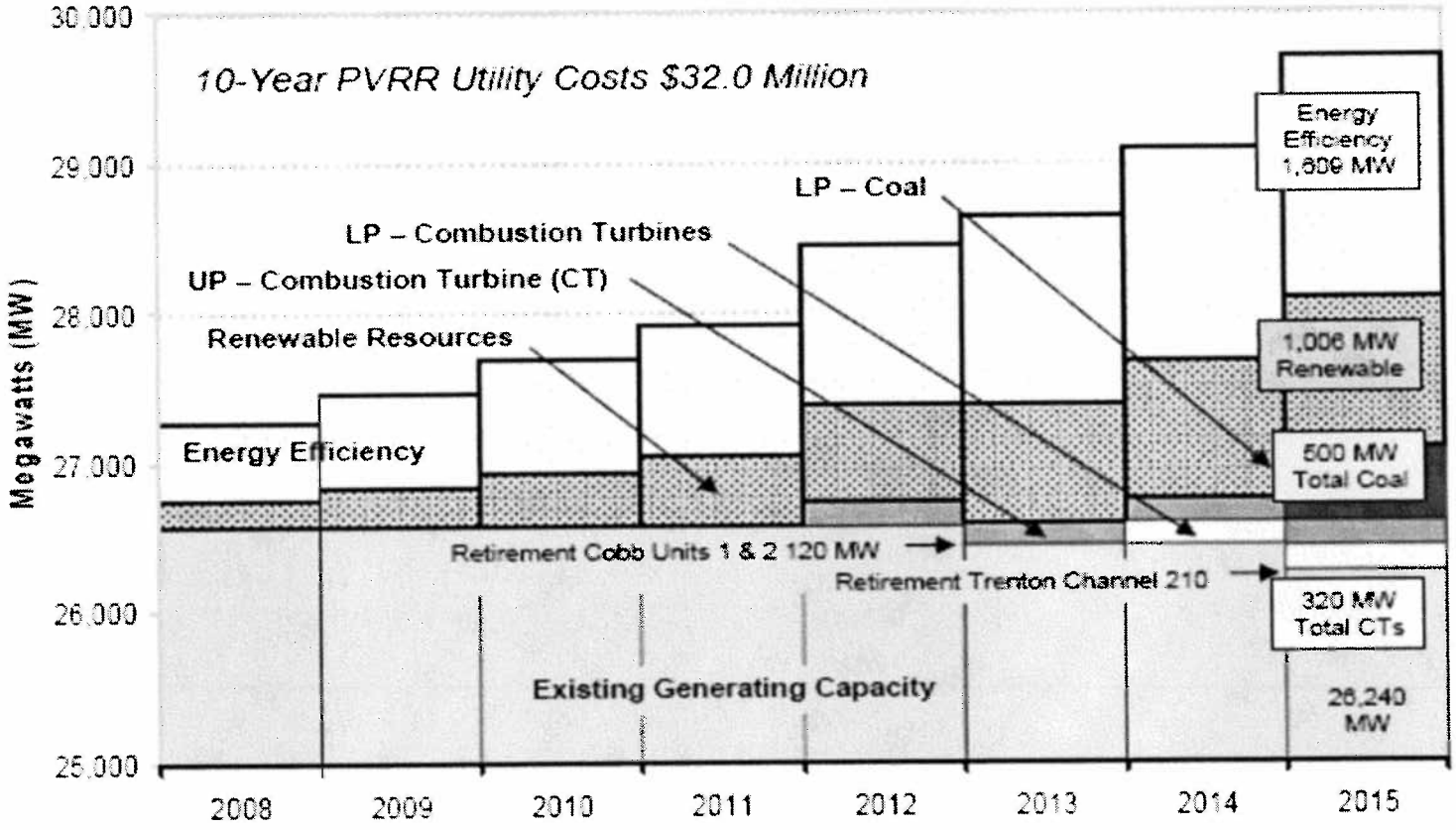
Essentially, Michigan has followed that "Energy Efficiency and Renewable Energy" scenario from the 21st Century Plan….and avoided billions of dollars of costs for new electricity generating plants….just as the 21st Century Plan predicted.

Congratulations to Michigan policymakers!

From Michigan 21st Century Plan: Energy Efficiency & Renewable Energy Scenario

(Appendix I, p.7)

Figure 5: Schedule of Cumulative Generation Additions for the Energy Efficiency with Renewable Energy Scenario



Note: LP Lower Peninsula, UP Upper Peninsula
PVRR - Present Value of Revenue Requirements

Energy Efficiency 3 cents/ kWh (no carbon)

Wind 7-8 cents/ kWh (no carbon)

A little gas or purch. power

MICHIGAN RATEPAYERS ARE ALREADY PAYING HUNDREDS OF MILLIONS OF DOLLARS IN LOWER RATES BECAUSE OF THE PA 295 ENERGY OPTIMIZATON POLICY

- The Attorney General technical staff estimated the annual cost to ratepayers of the coal plant proposed by Consumers Energy in 2007 was $270 million/year
- Apply that to just the 2 coal plants avoided by the energy efficiency in the 21st Century Plan analysis= ~ $540 million/yr. rate increase would have been in effect already
- Energy Optimization rate charges at the highest level (2012) have only been $169 million/yr.

  $540 million - $169 million = $371 million annual savings
- Ratepayers already seeing at least ~$371 million/yr. in lower rates than if the Energy Optimization policy did not exist.

IF THE MPSC 21ST CENTURY PLAN ANALYSIS WAS REPEATED NOW:

- Coal plants wouldn't be selected at all
  - Load growth is virtually flat
  - Coal costs now are over 10 cents/kWh (vs. 6 cents in original study)
- Energy Efficiency still by far the first priority
- Renewables and natural gas would fill in the remaining need

III. MICHIGAN HAS ENORMOUS REMAINING POTENTIAL FOR ENERGY EFFICIENCY

- Michigan's building stock is relatively old and inefficient (much constructed prior to advanced energy building codes)
- Recent data on existing buildings and equipment stock in Michigan shows huge need for efficiency improvements
- Other state studies on energy efficiency potential show large remaining potential…. even in states that have been doing utility energy efficiency programs for decades
- Michigan had ***no*** energy efficiency programs from 1996-2008

MICHIGAN'S BUILDING AND EQUIPMENT STOCK IS RELATIVELY OLD AND INEFFICIENT

Residential

- Two-thirds of residential dwellings in Michigan were built prior to 1980 - - in the era before there were any energy codes in place in Michigan

http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_B25034&prodType=table

Commercial

- 7 out of 10 commercial buildings in Michigan were built before 1990 - - meaning nearly all were built before Michigan implemented the relatively modest ASHRAE 1980 standard in 1986 (standard has been upgraded several times since)

https://www.michigan.gov/documents/mpsc/Michigan_Commercial_Baseline_Study_367665_7.pdf

DATA ARE AVAILABLE ON THE RELATIVELY INEFFICIENT BUILDING AND EQUIPMENT STOCK IN MICHIGAN

- *Michigan Baseline Study 2011: Residential Baseline Report*
  MPSC, 2011

  www.michigan.gov/documents/mpsc/Michigan_Residential_Baseline_Study_367668_7.pdf

- *Michigan Baseline Study 2011: Commercial Baseline Report*
  MPSC, 2011

  https://www.michigan.gov/documents/mpsc/Michigan_Commercial_Baseline_Study_367665_7.pdf

EXAMPLES OF RESIDENTIAL ENERGY EFFICIENCY NEEDS IN MICHIGAN, FROM THE 2011 MPSC REPORT

- 40% of homes still don't have high-efficiency showerheads
- 82% don't have pipe insulation on hot water pipes
- 93% don't have water heater insulation wraps
- A fourth of all homes still have no CFL lightbulbs
- 3/4s of homes with crawl spaces or unfinished basements had no floor insulation or crawl space/basement wall insulation
- Nearly 30% of homes had no rim joist insulation
- Nearly 30% with finished basements had no basement wall insulation
- Over one-fourth of homes still have single-pane windows
- Nearly one-fifth of homes have heating systems over 20 years old, and 61% of homes "never" have their heating system tuned
- Over half of central air conditioners are over 10 years old (one-sixth are over 20 yrs old), and 56% of households "never" have a tune-up
- Less than half (44%) of homes had programmable thermostats
- Only 14% of washing machines were "Energy Star" qualified
- One-fourth of homes still have operating second refrigerators

EXAMPLES OF COMMERCIAL ENERGY EFFICIENCY NEEDS IN MICHIGAN, FROM THE 2011 MPSC REPORT

- Nearly 30% of commercial buildings have no wall insulation
- Nearly half (49%) have roof insulation with R-value of R-12 or less
- 29% have single-glazed windows
- 90% have at least some inefficient T-12 lighting
- Less than 5% have the high-efficiency "Super T-8" or T-5
- 90% of do not have automated lighting controls
- Nearly a third still have incandescent exit sign lighting
- Only 18% of buildings with unitary HVAC systems have automated controls
- Less than one-fourth of buildings with air handlers have 'variable air volume" (high efficiency) units
- Less than a quarter (24%) of buildings with boilers have programmable thermostats or energy management systems
- Less than 10% of buildings with commercial refrigeration equipment have high efficiency measures such as heat recovery systems, high efficiency evaporator fans or floating head pressure controls

CONCLUSIONS

- **Energy efficiency** has been, and continues to be, Michigan's **cheapest energy resource by far** (one-third or less the cost of any other generation supply option); and has already helped Michigan ratepayers avoid billions of dollars in new electric generation costs.
- Michigan's building and equipment stock tends to be older and inefficient, in both the residential and business sectors; and **there is an enormous amount of remaining need for energy efficiency improvement.**
- The PA 295 Energy Optimization requirement should be continued, and consideration given to increasing the annual savings goals in the future. (The leading states are now saving over 2% per year.)